CITY OF BANCROFT (PWS 6150002)
SOURCE WATER ASSESSMENT FINAL REPORT

July 22, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for City of Bancroft, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the public water system (PWS).**

The City of Bancroft (PWS #6150002) drinking water system consists of two wells (City Well #1 and Railroad Well #2). City Well #1 operates as the primary supply source, while Railroad Well #2 is operated during the summer months to supply the additional water demands. The system currently serves approximately 430 persons through 170 connections.

The potential contaminant sources within the delineation capture zones include aboveground storage tanks (ASTs), underground storage tanks (USTs), a former boat manufacture, and a site regulated under the Superfund Amendments and Reauthorization Act (SARA). Additionally, Highway 30 and a railroad are transportation corridors that cross the delineations. If an accidental spill occurred from any of these corridors, inorganic chemical contaminants, volatile organic chemical contaminants, synthetic organic chemical contaminants, or microbial contaminants could be added to the aquifer system. Other sources identified that may contribute to the overall vulnerability of the water sources were business (i.e. engine repair, chemical storage, and grain storage) within the delineated areas that may be considered potential contaminants sources. A complete list of potential contaminant sources is provided with this assessment (Table 1 and Table 2).

For the assessment, a review of laboratory tests was conducted using the Idaho Drinking Water Information Management System (DWIMS) and the State Drinking Water Information System (SDWIS). Total coliform bacteria were detected at various sample locations in the distribution system between February 1992 and July 2000. In June 2000, fecal coliform bacteria were detected at the sample tap of City Well #1. Since July 2000, subsequent samples have not detected total coliform bacteria in the distribution system.

For the City Well #1, the inorganic chemicals arsenic, barium, fluoride, mercury, and nitrate have been detected in the drinking water, but at levels below the maximum contaminant level (MCL) for each chemical. Arsenic was detected in October 1998 at a concentration of 0.006 milligrams per Liter (mg/L). In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L, giving systems until 2006 to comply with the new standard. No volatile organic chemicals or synthetic organic chemicals have been detected in the well water.

The Railroad Well #2 is considered a backup source, therefore, the system is only required to test for the inorganic chemical nitrate. Our records indicate a sampling event for synthetic organic chemicals occurred in September 1993. At that time, no synthetic organic chemicals were detected in the drinking water. No volatile organic chemicals have been tested for the well.

The capture zones for the wells intersect a priority area for the inorganic chemical nitrate. The nitrate priority area is where greater that 25% of wells show nitrate values above 5 mg/L (MCL for nitrate is 10 mg/L). For City Well #1, nitrates concentrations have ranged from 4.75 to 8.8 mg/L between March 1987 and December 2001. For the Railroad Well #2, nitrate concentrations have ranged from 4.57 mg/L to 8.22 mg/L between December 1993 and September 2000.

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, City Well #1 rated high for IOCs, VOCs, SOCs, and microbials. System construction scores and hydrologic sensitivity scores were rated high. Potential contaminant inventory and land use scores were high for IOCs, VOCs, SOCs, and low for microbials. The well automatically scored a high susceptibility rating for microbials because fecal coliform bacteria were detected at the sample tap in June 2000.

In terms of total susceptibility, Railroad Well #2 rated high for IOCs, VOCs, SOCs, and microbials. System construction scores and hydrologic sensitivity scores were rated high. Potential contaminant inventory and land use scores were high for IOCs, VOCs, SOCs, and low for microbials. The well automatically scored a high susceptibility rating due to the presence of drainage ditches within 50 feet of the well.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the City of Bancroft, drinking water protection activities should continue efforts aimed at keeping the distribution system free of microbial contaminants that may affect the drinking water quality. If nitrate concentrations exceed the MCL, the system should take appropriate measures to treat the water sources. Treatments such as reverse osmosis for nitrates should be investigated to remedy this problem.

In addition, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). The wells should maintain sanitary standards regarding wellhead protection. Also, any new sources that could be considered potential contaminant sources in the wells' zones of contribution should also be investigated and monitored to prevent future contamination. No potential contaminants (pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the wells). Land uses within most of the source water assessment area are outside the direct jurisdiction of City of Bancroft. Therefore partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Caribou County Soil and Water Conservation District, and the Natural Resources Conservation Service. As a transportation corridor intersect the delineation (such as Highway 30), the Idaho Department of Transportation should be involved in protection efforts.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR <u>CITY OF BANCROFT</u>, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the public water system (PWS).**

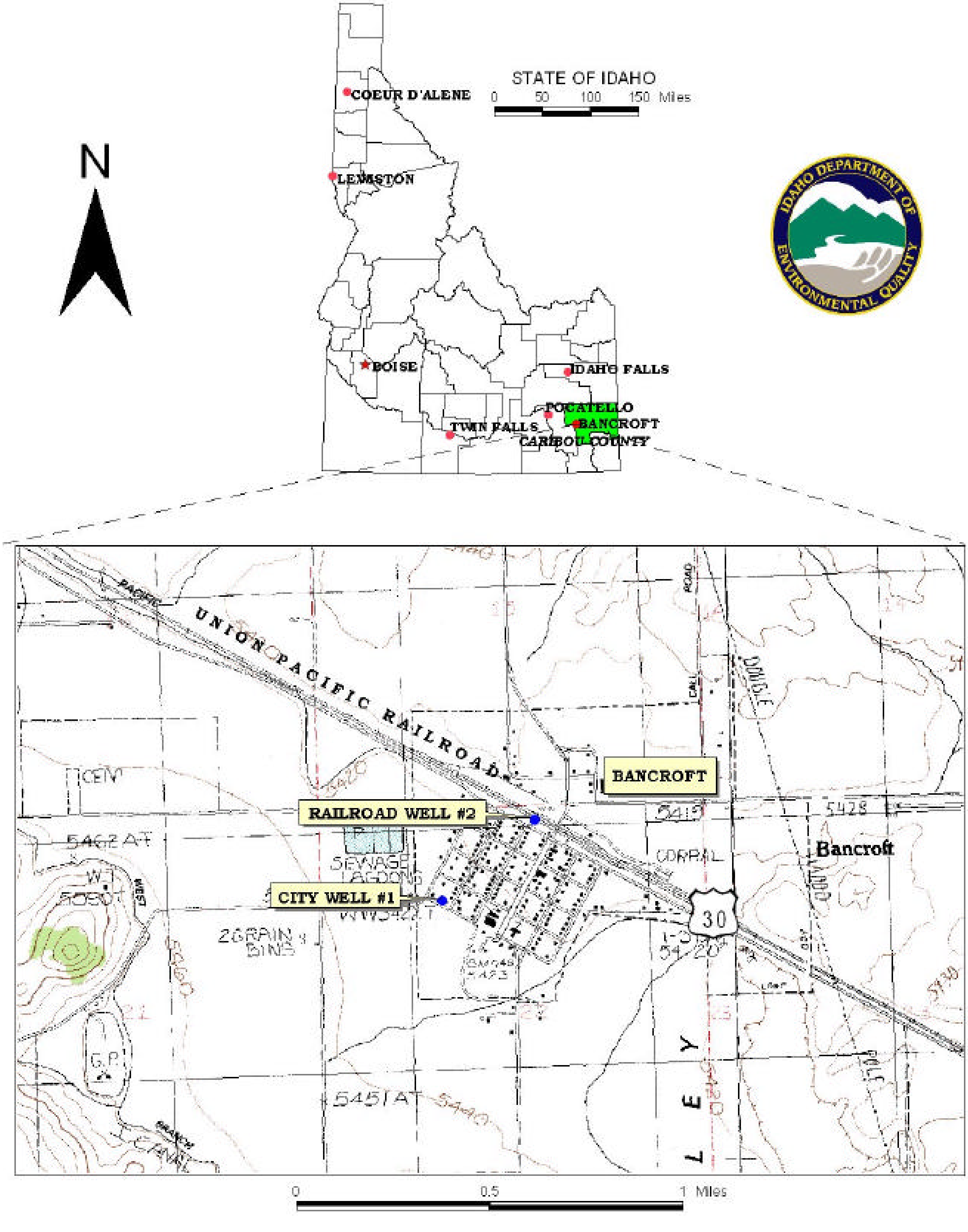
The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Bancroft (PWS #6150002) drinking water system consists of two wells (City Well #1 and Railroad Well #2). City Well #1 operates as the primary supply source, while Railroad Well #2 is operated during the summer months to supply the additional water demands. The system currently serves approximately 430 persons through 170 connections.

FIGURE 1. Geographic Location of the City of Bancroft



Total coliform bacteria were detected at various sample locations in the distribution system between February 1992 and July 2000. In June 2000, fecal coliform bacteria were detected at the sample tap of City Well #1. Since July 2000, subsequent samples have not detected total coliform bacteria in the distribution system.

For the City Well #1, the inorganic chemicals arsenic, barium, fluoride, mercury, and nitrate have been detected in the drinking water, but at levels below the maximum contaminant level (MCL) for each chemical. Arsenic was detected in October 1998 at a concentration of 0.006 milligrams per Liter (µg/L). In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L, giving systems until 2006 to comply with the new standard. No volatile organic chemicals or synthetic organic chemicals have been detected in the well.

Since the Railroad Well #2 is considered a backup source, the system is only required to test for the inorganic chemical nitrate. Our records indicate a sampling event for synthetic organic chemicals occurred in September 1993. At that time, no synthetic organic chemicals were detected in the drinking water. No volatile organic chemicals have been tested for the well.

The capture zones for the wells intersect a priority area for the inorganic chemical nitrate. The nitrate priority area is where greater that 25% of wells show nitrate values above 5 mg/L (MCL for nitrate is 10 mg/L). For City Well #1, nitrates concentrations have ranged from 4.75 to 8.8 mg/L between March 1987 and December 2001. For the Railroad Well #2, nitrate concentrations have ranged from 4.57 mg/L to 8.22 mg/L between December 1993 and September 2000.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a conceptual computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Portneuf Valley – Gem Valley hydrologic province in the vicinity of the City of Bancroft. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records, well logs (when available) and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

The Portneuf Valley – Gem Valley hydrologic province occupies approximately 211 square miles east of Pocatello, Idaho. The Basin and Range physiographic province is north to south trending and is bounded by the Wasatch, Chesterfield, and Portneuf mountain ranges to the southeast, east, and west, respectively. Average annual precipitation ranges from less than 15 inches on the valley floor near Bancroft to 35 inches in the mountains (Norvitch and Larson, 1970, p. 8). The average total depth for 26 wells in the Lava Hot Springs area is 188 feet, and the average depth to water is 83 feet (Baldwin, 2001).

The Portneuf and Gem valley floors consist of Quaternary alluvium, Quaternary olivine basalt flows, and sedimentary rocks of the Tertiary Salt Lake Formation (Norvitch and Larson, 1970, Figures 5 and 6, and Norton, 1981, p. 9). The basalt flows overlie and interfinger sediment deposits in the main portion of the province (Dion, 1969, p. 16). The basalts were extruded from cones and fissures near Alexander and between Niter and the Grace power plant and the Blackfoot Lava Field (Norton, 1981, p. 10). A surface geologic map of the Portneuf River Basin (Norvitch and Larson, 1970, p. 14) indicates that the western arm of the province is composed primarily of Quaternary alluvial deposits and Tertiary sedimentary rock outcrops. Ground water occurs in virtually every geologic unit; however, the principal aquifer is basalt. A broad northwest trending mound of water forms a ground water divide in the basalt aquifer at the southern margin of the province (Dion, 1969, p. 19 and Norton, 1981, Figure 5). Water north of the divide flows to the Snake River, and water south of the divide flows to the Bear River drainage that empties into the Great Salt Lake in Utah. Available water table maps indicate that the general ground water flow direction in the study area is to the Portneuf River, a tributary of the Snake River (Norvitch and Larson, 1970, p. 17, and Norton, 1981, p.15).

The primary source of ground water recharge to the basalt aquifer is precipitation on the valley floor and the surrounding mountains. Other sources are underflow from the Soda Springs hydrologic province through the gap at Soda Point and at Tenmile Pass, percolation from irrigation, canal leakage, and stream losses (Norton, 1981, p. 11, and Dion, 1974, p.19). The primary ground water discharge mechanisms are evapotranspiration, discharge through hundreds of springs and seeps, pumpage from wells, and underflow through the Portneuf Gap (Norton, 1981, p. 11; Norvitch and Larson, 1970, p 18; and Dion, 1969, p. 19).

The basalt aquifer has highly variable hydraulic properties. Specific capacities calculated from data obtained from driller's logs range from 2 to 3,000 gal/min/ft of drawdown (Norvitch and Larson, 1970, pp. 24-30). Hydraulic conductivities calculated from the above specific capacity data range from 11 to 6,000 ft/day, assuming an effective storage coefficient of 0.005 and a pumping time of 4 hours (p. B-1). A multiple-well pump test conducted near the city of Bancroft resulted in an estimated transmissivity of 400,000 ft2/day (3 million gal/day/ft; Norvitch and Larson, 1970, p. 24).

The delineated source water assessment area for City Well #1 trends in a southeast direction and is elongated and triangular in shape. The length of the delineation is 2.43, 3.94, and 5.38 miles for the 3-YR, 6-YR, and 10-YR TOT, respectively (Figure 2). The delineated source water assessment area for the Railroad Well #2 also trends in a southeast direction and is elongated and triangular in shape. The length of the delineation is 2.53, 4.13, and 5.7 miles for the 3-YR, 6-YR, and 10-YR TOT, respectively (Figure 3). The actual data used by WGI in determining the source water assessment delineation area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineation areas. Some of these sources include aboveground storage tanks (ASTs), underground storage tanks (USTs), a former boat manufacture, and a site regulated under the Superfund Amendments and Reauthorization Act (SARA).

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the <u>potential</u> for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in March 2002. The first phase involved identifying and documenting potential contaminant sources within the City of Bancroft source water assessment areas through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. This task was undertaken with the assistance of Mr. Charlie White. At the time of the enhanced inventory, additional potential contaminant sources were found within the delineated source water areas. Maps with well locations, delineated areas and potential contaminant sources are provided with this report (Figure 2 and Figure 3). Each potential contaminant source has been given a unique site number that references tabular information associated with the public water wells (Tables 1 and Table 2).

Table 1., Potential Contaminant Inventory for City Well #1

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
2	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
3	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
4	AST	0-3	Enhanced Inventory	VOC, SOC
5	AST	0-3	Enhanced Inventory	VOC, SOC
6	AST	0-3	Enhanced Inventory	VOC, SOC
	Highway 30	0-3	GIS map	IOC, VOC, SOC, Microbials
	Highway 30	3-6; 6-10	GIS map	IOC, VOC, SOC,
	Railroad	0-3	GIS map	IOC, VOC, SOC, Microbials
	Railroad	3-6; 6-10	GIS map	IOC, VOC, SOC,

[1] SARA =Superfund Amendments and Reauthorization Act.
UST = underground storage tank, AST = aboveground storage tank.
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Potential Contaminant Inventory for Railroad Well #2

Site #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	UST site, not listed; open	0-3	Database Search	VOC, SOC
2	UST site, truck transporter; closed	0-3	Database Search	VOC, SOC
3	SARA site	0-3	Database Search	IOC, SOC
4	School bus maintenance	0-3	Enhanced Inventory	IOC, VOC, SOC
5	AST	0-3	Enhanced Inventory	VOC, SOC
6	AST	0-3	Enhanced Inventory	VOC, SOC
7	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
8	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
9	AST, railroad	0-3	Enhanced Inventory	VOC, SOC
10	Heating Oil UST	0-3	Enhanced Inventory	VOC, SOC
11	Snowmobile parts & service	0-3	Enhanced Inventory	IOC, VOC, SOC
12	Old service station	0-3	Enhanced Inventory	IOC, VOC, SOC
13	Old boat manufacturer	0-3	Enhanced Inventory	IOC, VOC, SOC
14	AST	0-3	Enhanced Inventory	VOC, SOC
15	Grain Storage	0-3	Enhanced Inventory	SOC, Microbials
16	Chemical Storage (AST)	0-3	Enhanced Inventory	VOC, SOC
17	Chemical sales & storage	0-3	Enhanced Inventory	IOC
	Highway 30	0–3	GIS map	IOC, VOC, SOC, Microbials
	Highway 30	3-6; 6-10	GIS map	IOC, VOC, SOC,
	Railroad	0–3	GIS map	IOC, VOC, SOC, Microbials
	Railroad	3-6; 6-10	GIS map	IOC, VOC, SOC,

[1] SARA =Superfund Amendments and Reauthorization Act.
UST = underground storage tank, AST = aboveground storage tank.
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

The susceptibility of the wells to contamination were ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the wells, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

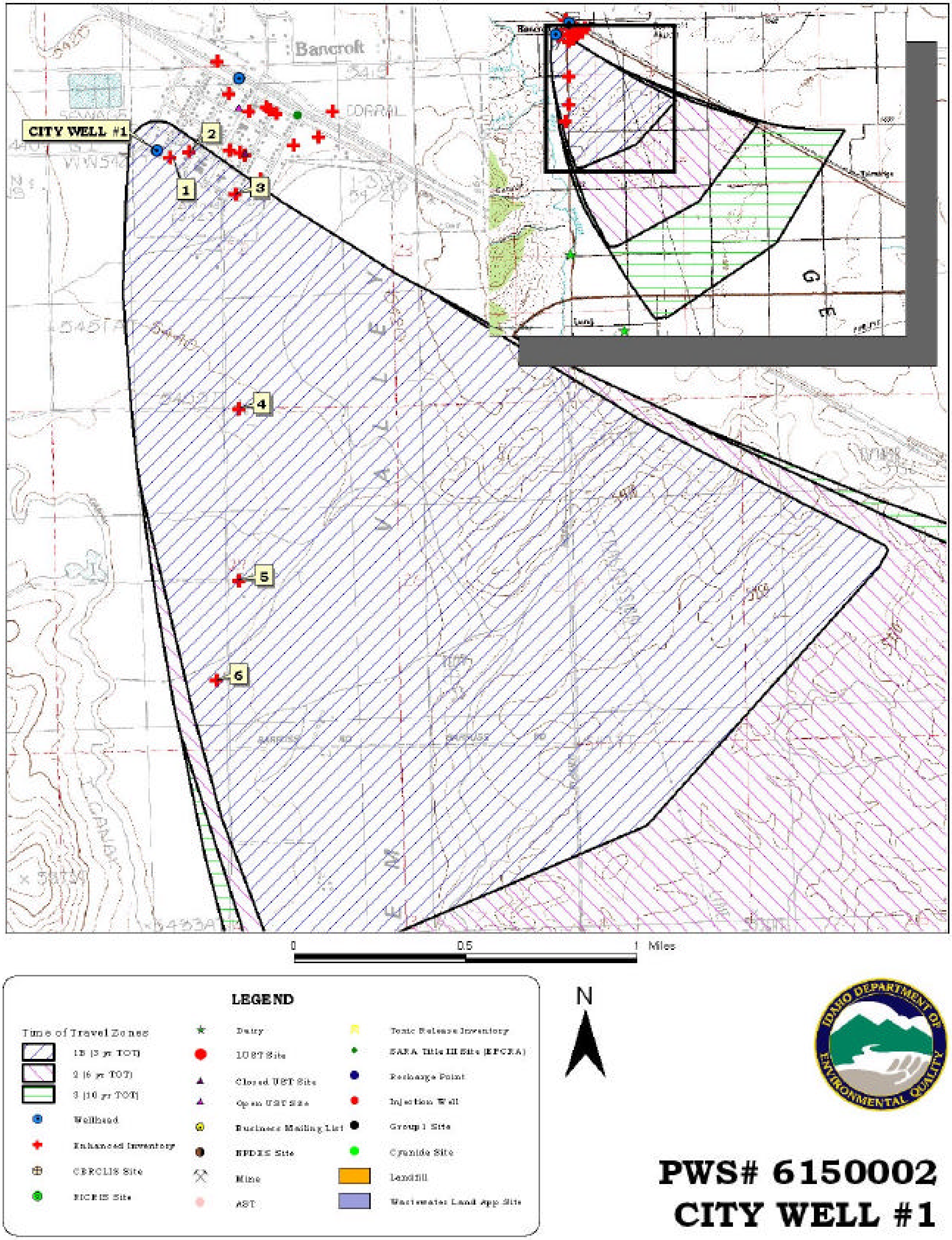
Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity was rated high for the City Well #1 (Table 3). This is based upon moderate to well drained soil classes defined by the National Resource Conservation Service (NRCS). Soils that have poor to moderate drainage characteristics have better filtration capabilities than faster draining soils. There was insufficient well log information to evaluate the vadose zone composition, the first depth to ground water, and whether there is at least 50 feet of cumulative thickness of low permeability material that could reduce the downward movement of contaminants.

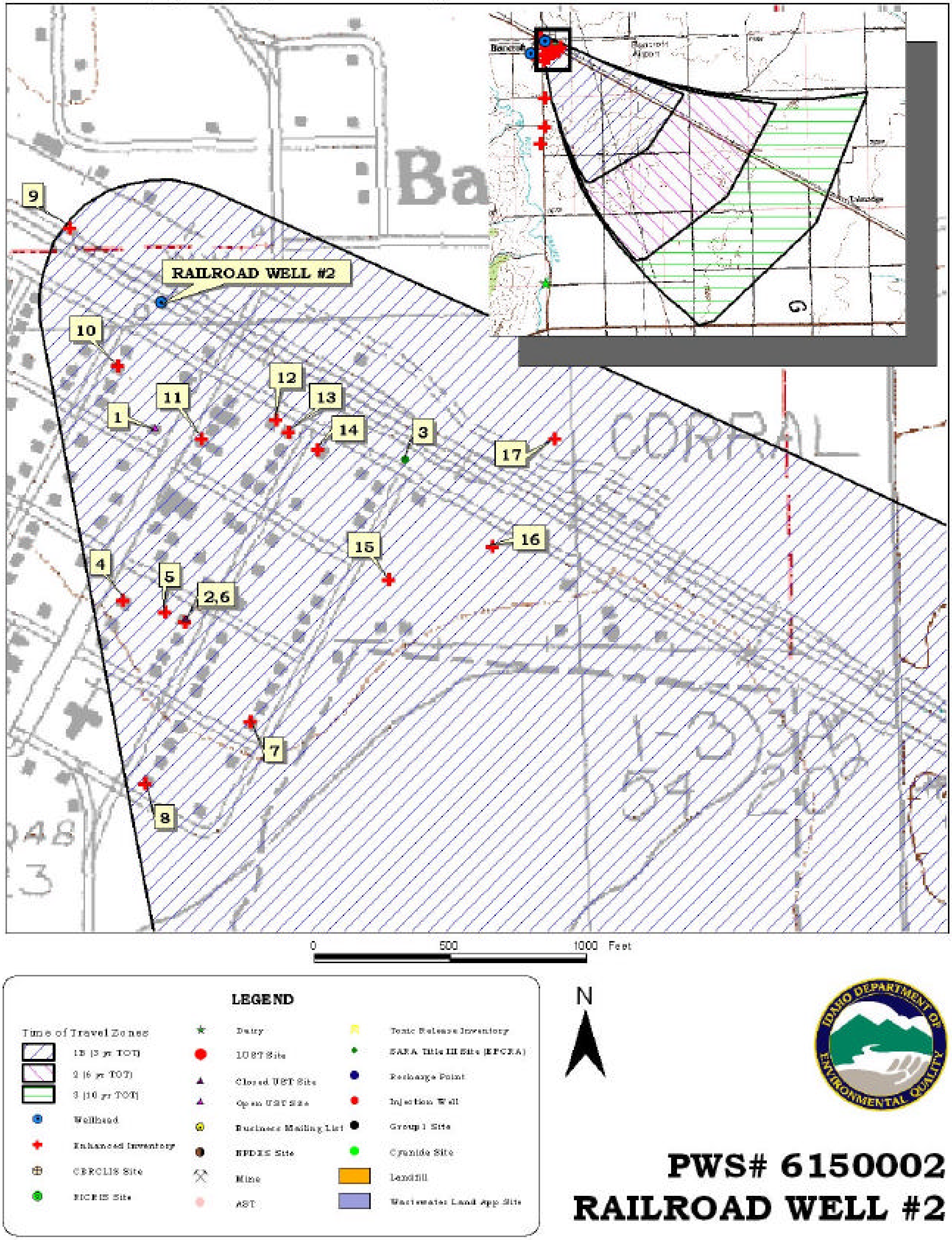
Hydrologic sensitivity was rated high for the Railroad Well #2 (Table 3). This is based upon moderate to well drained soil classes defined by the National Resource Conservation Service (NRCS). Soils that have poor to moderate drainage characteristics have better filtration capabilities than faster draining soils. There was insufficient well log information to evaluate the vadose zone composition, the first depth to ground water, and whether there is at least 50 feet of cumulative thickness of low permeability material that could reduce the downward movement of contaminants.

FIGURE 2. City of Bancroft Delineation Map and Potential Contaminant Source Locations



PWS# 6150002
CITY WELL #1

FIGURE 3. City of Bancroft Delineation Map and Potential Contaminant Source Locations



Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The system construction score was rated high for City Well #1. The well was reconstructed in 1993 from an older hand-dug well. The 1993 well log states the well was extended to 212 feet below ground surface (bgs) into lava rock. Static water level was recorded at 97 feet in June 1993. The 2000 sanitary survey (conducted by DEQ) states the wellhead does not have an acceptable well vent. There was insufficient well log information available to determine whether the well casing and annular seal extend into a low permeable geologic formation, and if the highest production interval of the well is at least 100 feet below the static water level. The well is outside of the 100-year floodplain, which may decrease the chance of contaminants being drawn into the drinking water source by surface water flooding.

The system construction score rated high for the Railroad Well #2. During the enhanced inventory, it was noted that a well vent did not exist on the wellhead. The purpose of the vent is to vent the space between the casing and the column and prevent a vacuum from forming when the well turns on and draws down the water table. A vacuum could draw in contamination through joints or leaks in the casing or cause the well to slough. There was insufficient well log information available to determine whether the well casing and annular seal extend into a low permeable geologic formation, and if the highest production interval of the well is at least 100 feet below the static water level. The well is outside of the 100-year floodplain, which may decrease the chance of contaminants being drawn into the drinking water source by surface water flooding.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gallons per minute (gpm) a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. In this case, there was insufficient information available to determine if the wells meet all the criteria outlined in the IDWR Well Construction Standards.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine the well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The predominant land use within the delineated capture zones for the City of Bancroft wells is predominately agricultural land.

Both wells rated high for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), SOCs (i.e. pesticides), and low for microbial contaminants (i.e. bacteria). The number and location of potential contaminate sources within the delineation contributed to the scores.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating. In this case, City Well #1 automatically rated high for microbials due to the detection of fecal coliform bacteria at the sample tap of City Well #1 (June 2000). The Railroad Well #2 automatically rated high for all contaminant categories due to the two drainage ditches that are located within 50 feet of the well. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) contribute greatly to the overall ranking.

Table 3. Summary of City of Bancroft Susceptibility Evaluation

Drinking Water Sources	**Susceptibility Scores**[1]									
	Hydrologic Sensitivity	**Potential Contaminant Inventory and Land Use**				**System Construction**	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
City Well #1	H	H	H	H	L	H	H	H	H	H*
Railroad Well #2	H	H	H	H	L	H	H*	H*	H*	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = City Well #1 automatically scored high due to detection of fecal coliform at the sample tap in June 2000. Railroad Well #2 automatically scored high due to drainage ditches within 50 feet of the well.

Susceptibility Summary

In terms of total susceptibility, City Well #1 rated high for IOCs, VOCs, SOCs, and microbials. System construction scores and hydrologic sensitivity scores were rated high. Potential contaminant inventory and land use scores were high for IOCs, VOCs, SOCs, and low for microbials.

In terms of total susceptibility, Railroad Well #2 rated high for IOCs, VOCs, SOCs, and microbials. System construction scores and hydrologic sensitivity scores were rated high. Potential contaminant inventory and land use scores were high for IOCs, VOCs, SOCs, and low for microbials.

For the City Well #1, the inorganic chemicals arsenic, barium, fluoride, mercury, and nitrate have been detected in the drinking water, but at levels below the MCL for each chemical. Arsenic was detected in October 1998 at a concentration of 0.006 mg/L. Nitrates have been detected in concentrations ranging from 4.75 to 8.8 mg/L between March 1987 and December 2001 (MCL for nitrate is 10 mg/L). No volatile organic chemicals or synthetic organic chemicals have been detected in the City Well #1.

The Railroad Well #2 is considered a backup source, therefore, the system is only required to test for the inorganic chemical nitrate. From December 1993 to September 2000 nitrate concentrations have ranged from 4.57 mg/L to 8.22 mg/L. Our records indicate a sampling event for synthetic organic chemicals occurred in September 1993. At that time, no synthetic organic chemicals were detected in the drinking water. No volatile organic chemicals have been tested for the well.

The county level herbicide use is considered high in this area. Although there may only be a small portion of agriculture land in the direct vicinity of the wells, it is useful as a tool in determining the overall chemical usage such as pesticides and how it may impact ground water through infiltration and surface water runoff. In addition, there were potential sources of contamination found within the wells' delineated TOT zones (Figure 2 and Figure 3).

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the City of Bancroft, drinking water protection activities should continue efforts aimed at keeping the distribution system free of microbial contaminants that may affect the drinking water quality. If nitrate concentrations exceed the MCL, the system should take appropriate measures to treat the water sources. Treatments such as reverse osmosis for nitrates should be investigated to remedy this problem.

In addition, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). The wells should maintain sanitary standards regarding wellhead protection. Also, any new sources that could be considered potential contaminant sources in the well’s zones of contribution should also be investigated and monitored to prevent future contamination. No potential contaminants (pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 50 feet of the wells). Land uses within most of the source water assessment area are outside the direct jurisdiction of City of Bancroft. Therefore partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Caribou Soil and Water Conservation District, and the Natural Resources Conservation Service. As a transportation corridor intersect the delineation (such as Highway 30), the Idaho Department of Transportation should be involved in protection efforts.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office	(208) 236-6160
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper at (208) 343-7001 or email her at mlharper@idahoruralwater.com for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

References Cited

Baldwin, J., 2001, Personal Communication from Joe Baldwin (IDEQ) to Sara West (Washington Group), December 28.

Dion, N.P., 1969, Hydrologic Reconnaissance of the Bear River in Southeastern Idaho, U.S. Geological Survey and Idaho Department of Reclamation, Water Information Bulletin No. 13, 66 p.

Dion, N.P., 1974, An Estimate of Leakage from Blackfoot Reservoir to Bear River Basin, Southeastern Idaho, U.S. Geological Survey and Idaho Department of Water Administration, Water Information Bulletin No. 34, 24 p.

Drinking Water Information Management System (DWIMS). Idaho Department of Environmental Quality.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Environmental Quality. 2000. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Environmental Quality. 2000. Sanitary Survey of City of Bancroft: PWS# 6150002, Caribou County.

Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Division of Environmental Quality Ground Water Program, October 1999. Idaho Source Water Assessment Plan.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Norton, M.A., 1981, Investigation of the Ground Water Flow System in Gem Valley, Idaho Department of Water Resources, Open-File Report, 29 p.

Norvitch, R.F. and A.L. Larson, 1970, A Reconnaissance of the Water Resources in the Portneuf River Basin, Idaho, U.S. Geological Survey and Idaho Department of Reclamation, Water Information Bulletin No. 16, Published by Idaho Department of Reclamation, 58 p.

Safe Drinking Water Information System (SDWIS). Idaho Department of Environmental Quality.

Washington Group International, Inc, January 2002. Source Area Delineation Report for the Portneuf Valley – Gem Valley Hydrologic Province.

Attachment A

City of Bancroft
Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

1. System Construction		SCORE			
Drill Date	reconstructed in 1993				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2000			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	NO	NO	YES
	Total Potential Contaminant Source/Land Use Score - Zone 1A	2	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	2	8	8	2
(Score = # Sources X 2) 8 Points Maximum		4	8	8	4
Sources of Class II or III leacheable contaminants or	YES	6	8	2	
4 Points Maximum		4	4	2	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B	14	16	14	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III	3	3	3	0
Cumulative Potential Contaminant / Land Use Score		24	26	26	10

4. Final Susceptibility Source Score	16	16	16	15
5. Final Well Ranking	High	High	High	High

1. System Construction

		SCORE
Drill Date	unknown	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2000
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		5

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	0	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	4	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	7	16	18	3
(Score = # Sources X 2) 8 Points Maximum		8	8	8	6
Sources of Class II or III leacheable contaminants or	YES	11	16	4	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		18	16	16	10

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		28	26	28	12

4. Final Susceptibility Source Score	17	16	17	15
5. Final Well Ranking	High	High	High	High